

Applic. No.: 10/680,379
Amdt. Dated October 15, 2007
Reply to Office action of July 26, 2007

REMARKS/ARGUMENTS

Reconsideration of the application is requested.

Claims 1-15 remain in the application. Claims 1 and 9 have been amended. Withdrawn claims 16-24 have been cancelled. Applicants reserve the right to file a divisional application for cancelled claims 16-24.

In item 2 on pages 2-4 of the above-mentioned Office action, claims 1-15 have been rejected as being unpatentable over Smayling (US 5,942,374) in view of Aomori et al. (JP 09-083040 - hereinafter Aomori) under 35 U.S.C. § 103(a).

The rejection has been noted and claims 1 and 9 have been amended in an effort to even more clearly define the invention of the instant application. Support for the changes is found on page 13, lines 17-20 of the specification.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claim 1 calls for, inter alia:

irreversibly fixing the activatable doping substance in the organic compound in regions that adjoin a source contact and a drain contact as a result of exposing the organic compound with the activation radiation;

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removing unbounded doping substance at reduced pressure or elevated temperature from the organic compound after the exposure.

Claim 9 calls for, inter alia:

after the exposure, removing unbounded doping substance at reduced pressure or elevated temperature from the organic semiconductor to irreversibly fix, in regions of the organic semiconductor adjoining the source contact and the drain contact, the doping substance in the organic semiconductor and to obtain contact regions adjoining the source contact and the drain contact, the contact regions having increased electrical conductivity, wherein a first distance is retained between the gate dielectric and the source contact and a second distance is retained between the gate dielectric and the drain contact, at which the organic semiconductor is applied directly with the contact region to the substrate.

Applicants have explained in detail in the previous responses to Office actions that the key feature of the present invention is that unbound doping substances are removed from the organic compound. In the description of the instant application (see page 6, line 22 to page 7, line 5), it is explained that in some cases an organic semiconductor has to have regions with high electrical conductivity and other regions with low electrical conductivity. The electrical conductivity of numerous organic semiconductors can be increased by the introduction of suitable dopants. However, in organic semiconductors dopants are not limited to a specific position and can move freely inside the material. Even if the doping process can originally be limited to a certain region, such as the regions around the source and

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drain regions, the dopants subsequently migrate through the entire organic semiconductor.

In order to avoid this disadvantage, the methods according to claims 1 and 9 of the instant application define that the doping substance is irreversibly fixed by irradiation in regions that adjoin a source contact and a drain contact and that unbound doping substance is removed. The irreversible fixing in certain regions by irradiation is achieved for instance by applying a mask, which covers the regions in which the doping substance shall not be fixed. However, after the irradiation the doping substance of the non-irradiated region can freely move through the organic semiconductor and cause significant disadvantages. In order to avoid such disadvantages, the unbound doping substance is removed at reduced pressure or elevated temperature.

This is not disclosed in Smayling.

In the outstanding Office action (and the previous Office action), the Examiner has alleged that Smayling discloses (column 10, lines 12-17) that after exposure of the dopant gas, the mask oxide layer is removed, i.e. the unbound doping substance is removed. Applicants have carefully considered this argument, but respectfully disagree for the reasons

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already outlined in the previous responses to the Office actions. Smayling teaches in column 10, lines 1-17 that a mask layer 58 is deposited over a neutral polyimide layer and next the mask layer is patterned and etched, wherein the etching step exposes a first region. In other words, Smayling teaches that the polyimide is partly exposed and the remaining part is still covered by the mask. The exposed region is exposed to a dopant gas such as diboran to establish a p-region. That is, Smayling teaches that the polyimide layer has two regions: one region being doped (the exposed region) and one (covered) region which is not doped due to the fact that it is covered. Finally, Smayling discloses that the remaining portion of the mask (not the doping substance) is removed. As a result, the layer contains one doped region and a second not doped region.

There is no disclosure in Smayling that the unbound doping substance is removed and in any case there is no disclosure in Smayling that the unbound doping substance is removed at reduced pressure or elevated temperature as now recited in claims 1 and 9 of the instant application.

Further, it is noted that Smayling also does not disclose that the doping substance is irreversibly fixed in the polyimide.

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It is only mentioned in Smayling that the polyimide is doped, but nothing more.

The Examiner has stated that Smayling does not disclose that doping substance in the organic compound is in regions adjoining the source contact and drain contact. However, the Examiner has further stated that this feature is disclosed by Aomori and thus the claimed invention of the instant application is rendered obvious in view of a combination of Smayling and Aomori.

Applicants have carefully considered the Examiner's argument and respectfully disagree.

Aomori relates to an organic semiconductor into which liquid crystal substituents are introduced. Aomori does not disclose that the organic semiconductor contains a doping substance. In contrast to Aomori, the present invention according to claims 1 and 9 relates to a doping substance. A person skilled in the art would immediately recognize that liquid crystal substituents are chemically totally different from dopants used in organic semiconductors. This follows immediately from comparing the chemical structure of liquid crystal substituents and the dopants disclosed in the instant application on page 11, line 1 to page 12, line 18. A person

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skilled in the art would, therefore, have no reason to combine Aomori with Smayling.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claims 1 and 9. Claims 1 and 9 are, therefore, believed to be patentable over the art and since all of the dependent claims are ultimately dependent on claims 1 or 9, they are believed to be patentable as well.

In view of the foregoing, reconsideration and allowance of claims 1-15 are solicited.

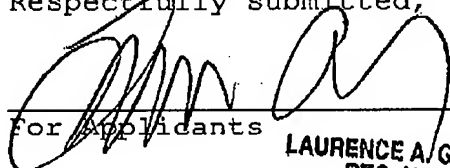
In the event the Examiner should still find any of the claims to be unpatentable, counsel would appreciate a telephone call so that, if possible, patentable language can be worked out. In the alternative, the entry of the amendment is requested as it is believed to place the application in better condition for appeal, without requiring extension of the field of search.

If an extension of time for this paper is required, petition for extension is herewith made. Please charge any fees which might be due with respect to 37 CFR Sections 1.16 and 1.17 to

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the Deposit Account of Lerner Greenberg Stemer LLP, No. 12-
1099.

Respectfully submitted,



For Applicants

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October 15, 2007

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